

# Connected learners: Implications for teaching in a connected world

Paul O'Neill, Central Queensland University  
Jane Carr, Education Queensland, the Learning Place

## Abstract

---

*This paper explores issues emerging in education as contemporary learners find more powerful alternatives to traditional classroom learning. Learning in the 21st century should be connected, engaged, relevant and challenging. 21st century learners are offered multiple ways to task. They can create weblogs and access people via SMS (short message service), send photos on mobile phones, communicate in chat rooms, author in collaborative online spaces, join multiple gaming strategies, access web authoring repositories and digital content. The opportunities for providing connectivity in learning environments are growing rapidly. Online communications provide easy access to information, knowledge and community. This revolution is changing the attitudes of teachers. Connecting is only the first step however, so a learning framework to support 21st century learners and examples of how it is used in classrooms is provided. This paper will explore some of the implications for teachers operating in a digital age.*

*"Today's students are no longer the people our educational system was designed to teach." (Prensky, 2004)*

## Introduction

---

Rapid developments of diverse new ICT devices and products have contributed to dramatic social changes and uncertainties for our society. The educational community has recognised the potential of science and technology to bring about new ideas, concepts, methods and products, which has lead to new possibilities and new uncertainties (Nowotny, Scott & Gibbons, 2001). The 'knowledge society' involves a completely new set of ideas about knowledge: what it is; how it develops; how it is used; what it is for and who owns it. These new ideas challenge many of the assumptions our schools rest on (Gilbert, 2005).

Formal school-based learning is coming under threat from emerging new technologies that have the potential to empower and engage learners in high level thinking activities in informal learning environments out of school (Siemens, 2004; Prensky, 2004). Prensky (2004) identifies that students who engage with ICT see a widening gap between the relevance of school based learning and the opportunities provided by connected learning environments.

Siemens (2004) argues that connected learning environments are powerful and multi-dimensional offering broad opportunities for self directed learning, experimentation and development of deep and enduring understandings of complex processes. Siemens refers to 'connectivism' as a learning theory for a digital age. This learning theory can be used as a lens for examining the 'actual' work that goes on in connected learning environments. In this theoretical framework, learning and knowledge rest in a diversity of opinions and in connecting information sources. Learning with and through other's experience is emphasised, as is a capacity to want to know more than what is already known. An ability to see connections between fields, ideas, and concepts is encouraged and the exposure to accurate, up-to-date information and knowledge is seen as highly important (Siemens, 2004).

This paper explores the emergence of the connected learner and examines the implications these clients place on an education system that is struggling to keep abreast of new ICT tools and opportunities. We begin by discussing the evolution of ICT in schools and examine the difficulties the current teacher workforce experiences in embracing ICT. We then look at the opportunities that can create connected classrooms and explore the outcomes of learning in such an environment. The Pedagogy in Action Framework (Dalton 2002) is a learning scaffold to support 21st century learners. An example of how it can be used in an ICT mediated environment is provided. In concluding we discuss the implications of such changes in a learning paradigm and the expectations this places on educators and policy makers to lead and design a futures oriented education system.

---

## **A rapidly changing world**

---

Education and the teaching profession are caught in the interplay between science and technology that is referred to in recent policy documents as the 'digital evolution' (Education Queensland, 2005). This term refers to the rapid development of new and more powerful digital technology infiltrating our daily lives. Widespread changes in the power of existing technologies and the exponential growth and development of new technologies pose some challenging questions for the future.

Despite the promise of ICT, the uptake of these technologies across the broader school communities in Australia has been slow (Kearney, 2006). Many commentators refer to a range of barriers (Downes et al 2002; Jones, 2004; Jukes and Dosaj, 2004; Spender and Stewart, 2003; Salmon, 2004). These include: teacher attitudes and beliefs about ICT; access to ICT resources; teaching strategies and practices and adequate professional development with ICT. Others refer to the enablers or the positive synergies required to embrace ICT such as: access to adequate hardware devices and software; fast access to the Internet; access to professional development;

access to time to learn new technologies and access to ideas about classroom pedagogies that empower ICT in learning design (Downes et al. 2002; Roblyer, 2004; Scrimshaw, 2004; Salmon, 2004). In this context teachers need to engage with new technologies in what Salmon (2004) refers to as 'new learning' about pedagogies and about ways of engaging contemporary learners in different ICT environments. Salmon acknowledges that teachers need to play a different role in deploying ICT where the learning design is more student centred and the role of the teachers is more one of 'e moderator'. Spender and Stewart (2003) outline this transitional change by describing teachers moving along a continuum from using a broadcast medium to an interactive medium. Traditional teaching, cinema, television, radio and theatre are all essentially one-way activities, and are categorised as broadcast media. By contrast, many contemporary media support two-way interactions, and are categorised as interactive media. Interactive media are characteristically web-based and include games, animations, web-based publishing and communication devices such as chats, discussions and web logs (blogs). This research describes a fundamental shift in the work of teachers in these times. Salmon (2004) argues that teachers are uncertain about the changes to learning made possible by ICT. Teacher capability with ICT is a significant issue in the current political and social climate, requiring physical and philosophical shifts in teacher practices (Candy, 2004; Downes et al 2002; Gibson, 2001; Hargreaves, 2004; Oliver and Towers, 2001; Spender and Stewart, 2002).

The relationships between these elements in the education arena form important platforms for discussion and observation as we continue to explore the nature of a different type of educational client: the connected learner.

---

## Connected learners

---

In this section we will explore the world of the contemporary 'connected' learner and in particular examine the types of interactions and outcomes connected learners bring to their learning. We will explore some trends emerging in various connected environments and make relevant comparisons between such connected and unconnected classrooms.

Teachers and their students differ greatly in their level of skill, acceptance and interaction with ICT. Students who are "growing up digital" (Seely Brown, 2004) often see their teachers as people who speak a different language. Prensky (2004) refers to this as the difference between a 'Digital Native' – one who was born into the digital era, and a 'Digital Immigrant' – one who has had the digital era imposed upon them. His research with contemporary students identified that teachers were a limiting factor in a student's capacity to be forward thinking and futures oriented in their approach to learning. He argues that today's students fundamentally think and process information differently

from their predecessors. They are used to receiving information fast: parallel processing and multi-tasking are at work in their minds and they function best when networked. This is an important difference between traditional teachers and contemporary learners.

Warschauer (2004) discusses that in today's society, the ability to access, adapt and create knowledge using ICT is critical to social inclusion. What is most important is not so much the physical availability of computers and the Internet but rather people's ability to use those technologies to engage in meaningful social practices. The digital divide is partly socio-economic, but it can also be seen in the gap between the student's and teacher's abilities to make use of those technologies.

Many commentators discuss the attributes that contemporary learners have compared to previous generations (Downes et al. 2002; Hargreaves, 2004; Prensky, 2004). Candy (2004) refers to this as a generational divide between young people and older Australians with respect to their familiarity and comfort with digital technologies. He contends that rather than being radically different, young people have been exposed to radically different stimuli from a young age. Students who are connected (via all manner of multimedia devices) have grown up in a world that abounds with information. They don't need to deeply engage in everything that passes their way. They grab what they need, remember where they found it and look for others who know more about it. Witness how a teenager learns to play Game Boy or Warcraft on the net. They are extraordinarily self directed learners in such an environment. Their learnings are social, action orientated and dependent on group knowledge. Connected learners know that they cannot know everything and that when they need to know it, they will be able to find it, from someone they know, or from somewhere they know and just in time, when they need it (Gee, 2003; Prensky, 2001).

Figure 1 outlines the possibilities that are available to a connected learner. Divided into primary and secondary sources, this diagram explains the connections that are possible through a range of contemporary communication tools listed at the bottom. This model identifies how students of the 21st century can actively create the communities in which they live and learn, through connecting structures or devices. Rather than live on the margins of those communities they inherit, contemporary learners can search for or create new communities in response to their own immediate needs and interests (Arnold & Ryan, 2003).

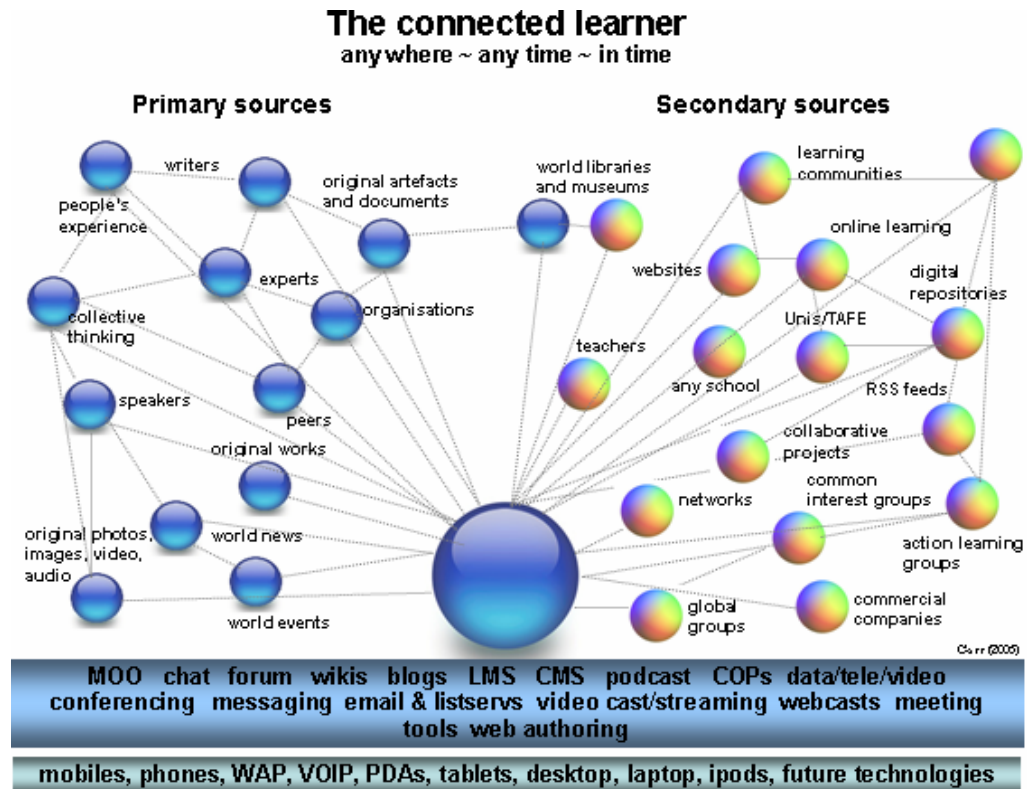


Figure 1: A connected learner (Carr, 2006)

Prensky (2004) argues that learners have been 'won over' by the engagement and enablement brought to them by modern communication tools and in particular 'games'. He argues that students can achieve skills of independent learning; self-paced and self directed learning and higher order thinking skills through these devices, so much so that when they go to school, they need to 'power down'. Has 'traditional schooling' lost its power? Should educators explore the possibilities of a connected classroom in order to engage contemporary learners?

Figure 2 describes an unconnected learner or classroom and in that familiar context will remind most of us of our traditional school experiences. To students without connection at home or school, without modeling of digital literacies, without a teacher who supports them to be self directed and can challenge their thinking by leading them into connected networks, partnerships, communities and worlds, learning still looks like this.

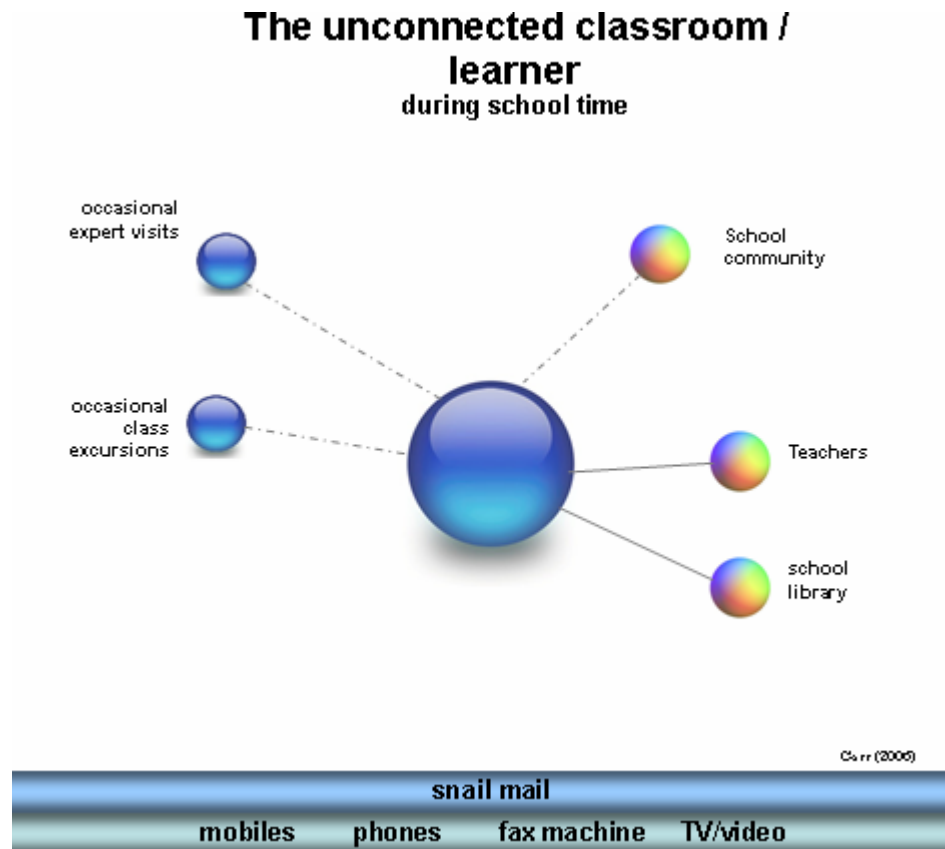


Figure 2: The unconnected classroom / learner (Carr, 2006)

Learning in the 21<sup>st</sup> century is quickly moving towards the haves and the have nots - the Connected and the Unconnected. This is happening in a time when schools today are being called to educate a more diverse population than ever before to higher standards than ever before. Schools are charged with the responsibility to educate students to thrive in a 21st Century world characterized by change and complexity with a workforce that in many respects doesn't have those skills (Dalton, 2002).

## Connected schools and learning

Siemens (2003) outlines numerous ways in which a connected environment can bring about a new educational outlook. These trends he refers to as justification for a new learning theory for a technological era. He begins by contrasting formal and informal learning or institutional versus non-institutional learning. Informal learning is a significant aspect of our contemporary learning experience. We no longer rely on formal education for the majority of our learning. Learning is now seen as a life-long process and occurs in a variety of ways – through communities of practice, personal networks, and in our daily routines, at work and play. Work related activities are no longer separate from our learning and in many situations, overlap. Technology has enabled a growth in communication capability that impacts directly on learning. Knowledge resides in our friends and colleagues, in experts and people's

experience and in non human systems (Siemens, 2003). Technology has the capacity to change how our brains function. The tools we use define and alter our thinking. Siemens states that know-how and know-what are now being supplemented with know-where; in other words, the understanding of where to find knowledge needed. This supports Gee's (2003) notion of 'just in time learning', an understanding that we can learn skills or content when we need them, as opposed to "just in case we need them" which is the situation in much of traditional schooling.

Education Queensland's Learning Place is a safe connected learning environment providing a comprehensive range of communication tools, digital resources, collaborative authoring spaces and projects to connect learners to their world. The Learning Place is designed on current understandings of learning and the premise that communication is at the heart of learning and is an essential key to life success (Dalton, 2002). While the Learning Place mimics much of what is available on the web, it provides a safe learning environment to explore connectivity. This environment plays an important role in Education Queensland's Smart Classroom strategy (2005-7) where ICT is integral to learning, individualised, student centric and values school and global networked learning communities.

Heppell et.al. (2004) show that more flexible approaches are needed to: the physical design of our schools and classrooms; computer ratios and device access; personal, diverse and individually powerful versus centrally owned and provided; size of classes and schools; professional learning for educators and the developing art and science of learning and teaching. The physical domain is important but not a guarantee that schools will effectively embrace new learning. What is required is a shift in our thinking that will assist us to equip learners with skills they will need in the future.

Gilbert (2005) contends that new knowledge comes, not out of the minds of individual group members, but from the relationships between them. She states that the idea of people as self-contained, individual, thinking 'subjects' is giving way to a focus on relationships, synergies, and connectedness, and on language's role in constructing, rather than simply representing, meaning. In this context the replacement of the standard view of knowledge by new ICT based forms has major implications for what we do in schools. Instead of seeing knowledge as an object we have to master, we need to see it as a process, something that happens in particular contexts and relationships. Instead of seeing thinking and learning as individual activities (and working together as cheating), we need to see thinking and learning as things that happen when people get together (Gilbert, 2005). Instead of trying to fill people up with knowledge 'just in case' they need it, we need to build people's ability to work with others to produce new knowledge that solves authentic real-world problems.

These trends identify significant issues for schools in the quest to embrace ICT and make them integral to learning (Education Queensland, 2005). Gilbert (2005) warns, that such changes don't just require educators to adapt what they are currently doing and thinking 'rather they represent a paradigm shift—a radical break with the past that requires us to rethink much of what we do'.

## Connected learning design

The learning framework used to underpin the development of instructional design strategies with online activity is the Pedagogy in Action Framework (Dalton, 2002). This framework has been used to plan, implement and review each online course and event so that online activities are focussed on student learning and knowledge development. Pedagogy in Action contains six learning and teaching practices essential to an effective learning community (Dalton, 2002).

Pedagogy in Action Framework	
Deep understanding	Self responsibility
Deep understanding of significant, life-related matters is essential to our students' futures and to improving their learning and achievement. This requires that we clearly understand how learners construct understanding to make meaning from learning.	The development of young people toward becoming self-responsible, self-directed learners and autonomous human beings is a major goal of education. Lifelong and lifewide learning will be essential in a world characterised by change and diversity. The role we play in helping children learn to take increasing control of their thinking, learning and behaviour is critical.
Inquiry	Human development
As human beings, we are biologically designed to seek to make sense of the world. Inquiry is fundamental to helping us to build our theories about the world, and to becoming lifelong and life-wide learners in a world characterised by change and diversity.	Of all the learning and teaching practices in which we engage, human development is the cornerstone from which we must work to help our young people become the kinds of adults who will thrive in, and make a positive difference to, the world they will inherit.
Communication	Collaboration
Communication is central to learning, and an essential key to life success. It is fundamental to making sense of, and successfully participating in, networked societies in a global world. That world is now awash with new communications media and information technologies, requiring we are able to use and blend traditional and new literacies simultaneously.	Collaborative effort is the lynchpin of any authentic community. It is essential for effective participation in family, in society, in the workplace, and will be critical for the future of our world. Working collaboratively not only helps to prepare students for life success, but also makes a dramatic difference to their learning and achievement.

Table 1: Pedagogy in Action Framework (Dalton 2002)



The Pedagogy in Action framework has enabled moderators and teachers to provide intellectual rigour in online activities and focus on maximising the power of connecting students to their world. A simple checklist is used by teachers and project officers in the planning and reviewing stage<sup>1</sup>.

<b>Deep understanding</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> purposeful, relevant, active involvement</li> <li><input type="checkbox"/> connected to learners' lives and real world contexts</li> <li><input type="checkbox"/> diversity acknowledged</li> <li><input type="checkbox"/> construction of understanding; multiple pathways</li> <li><input type="checkbox"/> making connections with important ideas and processes</li> <li><input type="checkbox"/> transfer/application to many contexts</li> <li><input type="checkbox"/> include assessment as an integral aspect of learning</li> </ul>	<b>Inquiry</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> problem-based learning</li> <li><input type="checkbox"/> questioning, investigating</li> <li><input type="checkbox"/> skills of researching</li> <li><input type="checkbox"/> rich topics, trans-disciplinary inquiry</li> <li><input type="checkbox"/> risk-taking, learning from error</li> </ul>
<b>Collaboration</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> commitment to teamwork, common vision/purpose</li> <li><input type="checkbox"/> shared responsibility and teamwork principles</li> <li><input type="checkbox"/> social-ethical values</li> <li><input type="checkbox"/> skills of working effectively with others</li> <li><input type="checkbox"/> involvement of broader community</li> </ul>	<b>Self responsibility</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> honouring intrinsic motivation</li> <li><input type="checkbox"/> learning how to learn</li> <li><input type="checkbox"/> increasing responsibility for learning,</li> <li><input type="checkbox"/> thinking and behaviour</li> <li><input type="checkbox"/> skills of self-direction and self-management</li> <li><input type="checkbox"/> focus on higher order thinking and reflection</li> </ul>
<b>Communication</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> integrate communication literacies</li> <li><input type="checkbox"/> focus on substantive dialogue</li> <li><input type="checkbox"/> use of language to empower learners</li> <li><input type="checkbox"/> multiple ways of accessing/demonstrating learning</li> <li><input type="checkbox"/> integrated use of multi-media and information technology</li> <li><input type="checkbox"/> home-school communication</li> </ul>	<b>Human development</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> caring relationships</li> <li><input type="checkbox"/> developing proactive personal qualities, attitudes, dispositions</li> <li><input type="checkbox"/> principled, social-ethical values</li> <li><input type="checkbox"/> leadership: creating preferred futures and the 'new'</li> <li><input type="checkbox"/> fostering community: unity, diversity, and citizenship</li> </ul>

Table 2: Pedagogy in Action Framework checklist, (Dalton, 2002)

<sup>1</sup> The full Pedagogy in Action Framework is available through PLOT: [www.plotpd.com](http://www.plotpd.com) and is provided in this paper with permission from the author, Joan Dalton.

## Connected new learning

In this section we will examine how a learning event can be transformed through the application and integration of online tools and connected learning opportunities. This has been demonstrated over time in the evolution of the annual Online Literature Festival.

In 2001 the Ipswich Children's Literature Festival was a face to face event with Australian authors meeting students from local schools. Figure 3 outlines the type of interaction that occurred in this event.

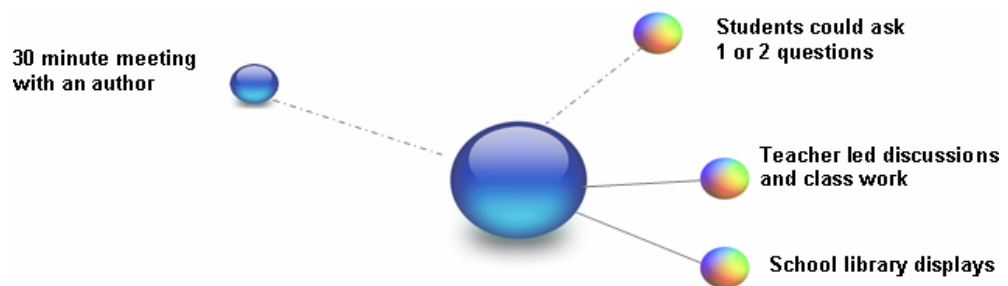


Figure 3: Face to face excursion between a class and an author

Students were seated in front of an author for 30 minute sessions and could ask questions. Although it was valuable for students to meet these talented people, in depth and meaningful conversations were rare. In 2003, the Learning Place introduced an online component and 800 students chatted online with 27 authors. The conversations that ensued were fairly basic, question and answer sessions. Subsequently, a great deal of effort was put into making the next online festival an event with deep understanding, inquiry and collaboration within meaningful social interaction. This planning was underpinned by the Pedagogy in Action framework and synthesized into 3 essential questions:

- How could we ensure intellectual quality in the online discussions?
- How could we more effectively prepare teachers, students and authors for participation in the event?
- How could we create a universal Online Literature Festival?

Other challenges reflected the need to offer the Festival as a whole learning journey not simply an event. Also a more effective way to manage registrations and to improve the online skills of moderators, guests, students and teachers was required (D'castro & Keighley, 2005).

The 2005 Online Literature Festival was reported as an outstanding success with 94 authors and illustrators from around the world and 5535 students participating in book launches, online debates, writing workshops, characters online, critical discussions and book RAPS. School districts sponsored authors and enjoyed special private online chats with those authors. The Festival

partnered with National Literacy Week, the State Library of Queensland and public libraries to further strengthen the success of the festival.

The key factors to success in this state wide online event were three fold:

- Each event had a clear focus related to a strong curriculum purpose;
- Quality assured evaluated curriculum digital resources and activities supported the pre and post online activity;
- All participants (guests, students, teachers and moderators) took part in practice sessions so that the online environment and tools were familiar, skills were practiced and there was a shared agreement about how each online event was to be run (netiquette, rules, processes, purpose and learning outcomes).

Moderators, guests and teachers were skilled in engaging students in conversations that promoted deep understanding through use of a range of strategies and questioning techniques.<sup>2</sup> Students understood the netiquette required in an educational chat and were prepared for each event having first researched and considered their questions.

What eventuated were powerful teaching and learning opportunities. Students asked relevant informed questions that resulted in meaningful conversations with authors and illustrators about their work, their thinking and their lives. Students co-created characters and chapters for authors and in some cases influenced authors and their work. Figure 4 demonstrates the increased opportunities provided through the development of more connected and interactive resources to support the growing event.

---

<sup>2</sup> A Professional Learning Community website supports all participants and includes a range of strategies and skills to support adult and student learners:  
<http://www.learningplace.com.au/sc/ipswich/olf>

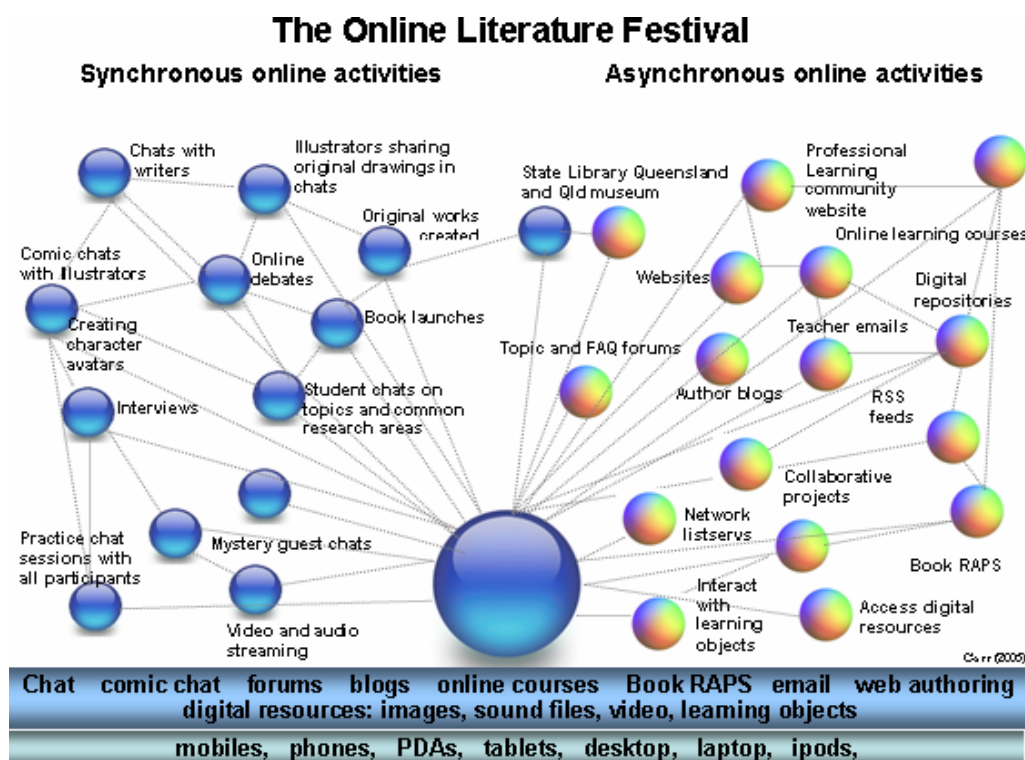


Figure 4: The Online Literature Festival 2005-6

Interactions with students and authors as a result of the festival indicated a deeper learning opportunity was created for all involved. Authors found a connection with their readers that had never been possible before on such a large scale.

*Because of my speech impediment, I have never been able to discuss my work with the primary target, children. This was an empowering life changing event for me. I conversed, debated, explained and was able to finally share my thinking behind the stories. (as cited in an email from a participating author 10.11.2005)<sup>3</sup>*

Students also found the interaction with authors informative and rewarding, assisting them to understand more fully the process of writing such books but also to assist them in aspiring to write themselves, as one year 4 student described:

*I am going to be a writer. I told xxx I wanted to be a writer just like him. He replied... No, be a writer just like you. And that's what I'm going to be."*  
Student quote

<sup>3</sup> Author requested name withheld for privacy reasons.

Large online events are influential in supporting and enabling learning. However what is changing the hearts and minds of teachers is their own ability to use these online environments and their knowledge of pedagogy to connect students to authentic learning activities. When a teacher can help their students to connect to new ways of thinking, new learnings and different perspectives it is an experience they will reflect upon and build into their teaching repertoire.

*'To me, information and communication technology brings the world to the classroom. It just takes the walls away. When students can access real, totally up-to-date information from real experts – like chatting online to scientists in Antarctica through a project room on The Learning Place – well, you just can't get much better than that.'*

Greg Cooper, Kawungan SS

The implication for all teachers is to embrace connecting technologies and the opportunities for learning they provide. Teaching is a profession that requires constant updating of skills and ongoing reflection of current learning theories and how our teaching practice best prepares students for life success in their changing world. Teachers need to make best use of new communication technologies in authentic and challenging learning environments. Schools need to foster authentic professional learning activities that assist teachers to grasp and make the most of learning opportunities. Systems need to support the learning process by providing flexible and consistent infrastructure, good bandwidth, technical support, and an online learning environment designed for learning.

## Conclusion

---

*For teachers of the 21st century, now is the time for the revolution in education: out of the box; out of the classroom; just in time learning vs just in case; go beyond the ordinary; innovate, not recite; make it real.*

Scott (1999)

To rise to Michael Scott's challenge, educational systems and school communities need to work together to answer two critical questions.

1. What are the learning skills and tasks needed for learners to flourish in a digital era? Siemens (2004)
2. What qualities, dispositions, characteristics, capacities and values will young people need to develop to thrive and contribute to their world? (Dalton, 2004)

The answers to these questions should be used to develop learning programs, new pedagogies and resources for our 21<sup>st</sup> century students. Some schools have already taken up this challenge and are moving towards negotiated curriculum, participating in collaborative online projects, exploring multimedia and their new literacies and connecting students to real world events, people and learning opportunities. To ignore the new technologies and the opportunities for learning they provide would be to ignore the world in which students are living.

What is significant in this debate is that the processes available to contemporary learners to assist thinking, learning, knowledge production or intellectual growth have changed through the application of new ICT based opportunities. Gilbert (2005) believes we need to replace the industrial-age, assembly-line metaphor with a metaphor that works in the knowledge-age context – one that is based on the idea of a system, or a network, that has multiple possibilities, multiple connections, and multiple pathways. A connected Smart Classroom is one such metaphor.

A Smart Classroom (Education Queensland, 2005-7) is a rich and engaging learning environment where ICTs are integral to learning and used to make meaningful connections. Learning is not restricted by time or place. Students and teachers are able to work in smart ways, accessing experts and other learning networks to share, plan, investigate, challenge, research, communicate, collaborate and create.

Resources for this kind of learning need to be high quality and available when you need them. They can be digital materials (images, sound files, video)...they can be products (websites, online courses and lessons, learning objects)...they can be events (online chats, festivals, collaborative projects) and they need smart connecting tools and authoring spaces. Smart Classrooms also need to share the wonderful stories of successful 21<sup>st</sup> century teaching practice as Antoine-Marie-Roger de Saint-Exupery (1900-1944) explains:

*If you want to build a ship, don't drum up the men to gather wood, divide the work and give orders. Instead, teach them to yearn for the vast and endless sea.*

## References

---

- Antoine-Marie-Roger de Saint-Exupery (1900-1944)  
<http://www.westegg.com/exupery/> (accessed June 1 2006).
- Arnold, R. and Ryan, M. (2003) *The Transformative Capacity of New Learning*, Discussion paper delivered to the Western Australian Legislative Assembly on the Western Australian College of Teaching Bill, September 2003, Hansard, pp. 11278b-11313a/1.
- Berners-Lee, T., Hendler, J., Lasilla, O. (2001) Semantic Web. *Scientific American*, May 2001 (p.1).
- Carr-Greg, M. (2005) *Adolescent learners*. Public address delivered at the Middle Phase of Learning Conference, Carlton Crest Hotel, Brisbane, October 2005.
- Candy, P.C. (2004) *Linking Thinking: self directed learning in the digital age*, Department of Education Science and Training, Canberra.
- Carr, J. (2006) *Connected or disconnected*. Keynote address delivered to Janison Communications Conference, Coffs Harbour, November, 2005.
- Dalton, J. (2004) PLOT: *Professional Learning Online Tool*; [accessed April 2006] [www.plotpd.com](http://www.plotpd.com)
- D'Castro, J. and Keighley, C. (2006) *A Hero's Journey*, Presentation delivered to Janison Communications Conference, Coffs Harbour, November, 2005.
- Downes, T., Fluck, A., Gibbons, P., Leonard, R., Matthews, C., Oliver, R., Vickers, M., & Williams, M. (2002). *Making Better Connections. Models of teacher professional development for the integration of information and communication technologies into classroom practice*. Canberra: Department of Education, Science and Training.
- Education Queensland. (2002). *Education and training reforms for the future: ICT's for Learning 2002 -2005*.
- Education Queensland. (2005). *Smart Classrooms: A strategy for 2005-2007*.
- Gee, J.P. (2003) *What Video Games Have to Teach Us about Learning and Literacy*, New York: Palgrave Macmillan.

- Gilbert, J. (2005) *Catching the Knowledge Wave? The Knowledge Society and the future of education*. New Zealand Council for Educational Research, Wellington, 2005. ([www.nzcer.org.nz](http://www.nzcer.org.nz)).
- Hargreaves, D. (2004). *Transforming teaching and learning through ICT*. Paper presented at the Education .au Conference, Sydney.
- Heppell, S., Chapman, C., Millwood, R., Constable, M., Furness, J. (2004). *Building Learning Futures: a research project at Ultralab*. CABA/RIBA Building Futures programme report.
- Jones, A. (2004). *Barriers to the uptake of ICT by teachers*: British Educational Communications and Technology Agency (Becta).
- Joseph, J. (2003) Learning with the brain in mind. *Focus Education Australia*, Winter 2004.
- Jukes, I. & Dosaj, A. (2004). *Understanding Digital Kids: Teaching and Learning in a Digital Landscape*. In: The Info Savvy Group.
- Kearney, T. (2006) Keynote address, Learning Place Conference Jan 15, 16 2006, Nowotny, H., Scott, P., Gibbons, M. (2002). *Rethinking Science: Knowledge and the Public in an Age of Uncertainty*. London: Polity.
- Oliver, R. & Towers, S. 2000, Uptime: Students, learning and computers. A *Study of ICT Literacy and access among Australian Tertiary Students*, Canberra, Australian Department of Education, Training and Youth Affairs.
- Prensky, M. 2001, *Digital Game-based Learning*, New York, McGraw Hill.
- Postman, N. 1999 *Building a bridge to the 18<sup>th</sup> century: how the past can improve our future*, Random House, New York.
- Roblyer, M.D. (2004). *Integrating educational technology into teaching*, Third Edition. Pearson Prentice-Hall.
- Salmon, G. (2004) *E-Moderating: The key to teaching and learning online* (2nd Ed.) London: Taylor and Francis.
- Scrimshaw, P. (2004). *Enabling Teachers to make successful use of ICT*: British Educational Communications and Technology Agency (Becta).



Scott, M. (1999) *On the edge of the new millenium*, UCLA School of Law, Southern California Chapter Conference. Year 2000 – Where Are We Now?

Seely - Brown, J. (2000). Growing Up Digital. *Change* (March / April), 11- 20.

Siemens, G. (2004) *Connectivism: A learning theory for a digital age*, Creative Commons, [accessed March 2006]  
<http://www.elearnspace.org/Articles/connectivism.htm>

Spender, D., & Stewart, F. (2002). *Embracing e-Learning in Australian Schools*. Brisbane: Commonwealth Bank.

Spender, D. 2002, *E-learning and its future*, Keynote address to the Global Summit on Online Knowledge Networks, Adelaide, South Australia, March 3–5 2002. Available online at:  
<http://www.educationau.edu.au/globalsummit/papers/> [accessed 15 January 2003].

Warschauer, M. 2004, *Technology and Social Inclusion; rethinking the digital divide*. MIT Press, Cambridge, MA.